The effects of temperature change on the infection rate of *Biomphalaria glabrata* with *Schistosoma mansoni*

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The aim of this study was to investigate the influence of temperature on the development of Schistosoma mansoni *infections in* Biomphalaria glabrata. *The snails were infected at 15, 20, and 30ºC, and the cercarial release was analyzed after 30 and 60 days post-infection. Our results showed that a decrease in the temperature has a substantial influence on the development of* S. mansoni *infection in* B. glabrata, *with significant differences ($p < 0.05$) between 15 and 30ºC. These data could provide a better understanding of the epidemiological aspects of schistosomiasis.*

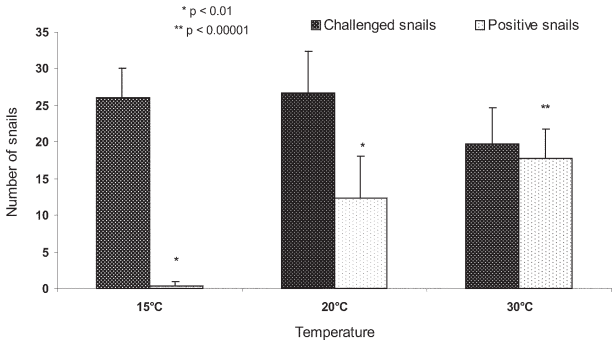
Key words: *Biomphalaria glabrata* - *Schistosoma mansoni* - temperature

The development of the life cycle of *Schistosoma mansoni* in its intermediate host is influenced by environmental and endogenous factors. Temperature (Maldonado & Acosta-Matienzo 1947, Stirewalt 1954) and luminosity (Standen 1951, Valle et al. 1971) are among the most important environmental factors. Typically, miracidium-cercaria transformation takes about 30 days (Pan 1965). The aim of this study is to evaluate the influence of the temperature on *S. mansoni* infection in *Biomphalaria glabrata. S*nails in the same age and kept the feeding conditions were incubated at temperatures of 15, 20, and 30°C for 12 h in BOD® stove; after that they were individually infected with 10 *S. mansoni* miracidia according to Barbosa and Barreto (1960) technique, and kept at the same temperature for the same period of time. The group comprised 30 snails each and the proceeding was made in triplicate.

Afterwards, the groups were individually replaced in aquariums at room temperature, and weekly analyzed until the 60th day after infection concerning the cercarial release. The results were analyzed by the ANOVA test (Zar 1996).

Our results show a direct relationship between temperature and infection rate, i.e. the lower temperature is the lowest is the infection level of *B. glabrata* with *S. mansoni*. The differences among the temperatures of 15 and 20°C ($P < 0.01$), 20 and 30°C ($P < 0.01$), and 15 and 30°C ($P < 0.0001$) were statistically significant. When the temperature was 15ºC only 1.3% of the *B. glabrata* exposed to *S. mansoni* became infected, whereas when the temperature were 20 and 30ºC the rates were 46 and 89%, respectively (Figure).

The success of the snail infection by a trematode depends at least on three main factors: the age of the snail at exposure, the temperature of the water in which the snail and the parasite are located, and the mollusc nutritional status, which determines a more or less fast growth of the snail throughout infection (Smyth & Hailton 1983). An important factor of success of *B. glabrata* infection with *S. mansoni* is the temperature at the moment of contact between the host and the parasite. Maldonado and Acosta-Matienzo (1947) demonstrated that the decrease of 1ºC in the water temperature (from 26 to 25ºC) caused a decrease of 50% in the infection level, which used to be 80% at 26ºC. Similar results were found by Standen (1951). Stirewalt (1954) studied the effect of temperature maintenance on development of *S. mansoni* intramollusc. The obtained results demonstrated that in determined stages, the relationship between trematoda and mollusc was strongly influenced by the temperature reduction, occurring a delay in the release and a strong reduction in the number of eliminated cercariae by each snail individually. In some cases, a total stoppage occurred in the sporocyst development in snails kept at temperatures from 23 to 25ºC after miracidia exposition. Under the epidemiological point of view, the temperature is of great importance. Climatic changes occurred in some Brazilian regions could cause



Variation of the infection rate in *Biomphalaria glabrata* snails infected with *Schistosoma mansoni* in three different temperatures.

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changes in the schistosomiasis index prevalence, especially in endemic areas where a persistent cold wind occurs.

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